

What is Claimed is:

1. A honeycomb structure comprising:

a plurality of through channels extending to an axial direction of a honeycomb structure,

5 porous partition walls separating through channels one another, and

plugging portions; said plugging portion plugging predetermined through channels at one end and the rest of through channels at other end opposite to the plugged end of  
10 the predetermined through channels,

wherein a through-hole is formed in at least a part of the plugging portion, and a diameter of the through-hole is 0.2 mm or more, but not more than a value which is smaller between 1 mm and 75% of a diameter of an inscribed circle of  
15 the through channel.

2. The honeycomb structure according to claim 1, wherein the diameter of the through-hole is 0.4 mm or more, but not more than a value which is smaller between 0.8 mm and  
20 60% of the diameter of the inscribed circle of the through channel.

3. The honeycomb structure according to claim 1, wherein a sectional area of the through-hole of the plugging  
25 portion in the vicinity of an outer peripheral portion of the honeycomb structure is larger than that of the through-hole of the plugging portion in a central portion of the honeycomb

structure.

4. The honeycomb structure according to claim 1,  
wherein each sectional area of a through-hole formed in a  
5 plugging portion of the honeycomb structure is substantially  
nonuniform each other.

5. The honeycomb structure according to claim 1,  
wherein a sectional shape of the through-hole in a through  
10 direction of the through-hole is a tapered shape or a  
contracted shape.

6. The honeycomb structure according to claim 1,  
wherein an oxidation catalyst is carried on at least the  
15 plugging portion in which the through-hole is formed, or in  
the plugging portion in which the through-hole is formed and  
the vicinity thereof.

7. The honeycomb structure according to claim 1 is  
20 used as a filter for trapping/collecting/ removing  
particulate materials included in dust-containing fluids such  
as an exhaust gas of an internal combustion engine by virtue  
of filterability of the partition walls.

8. The honeycomb structure according to claim 1,  
25 wherein a sectional shape of the through channel is any one  
of a triangular shape, a quadrangular shape, a hexagonal

shape, and a circular shape.

9. The honeycomb structure according to claim 1,  
wherein the honeycomb structure is made of a material  
5 containing any one selected from the group consisting of  
cordierite, silicon carbide, silicon nitride, alumina,  
mullite, and LAS as a major crystal phase.

10. A method for manufacturing a honeycomb  
10 structure comprising a plurality of through channels  
extending to an axial direction of a honeycomb structure,  
porous partition walls separating through channels one  
another, and plugging portions; said plugging portion  
plugging predetermined through channels at one end and the  
15 rest of through channels at other end opposite to the plugged  
end of the predetermined through channels, wherein a through-  
hole is formed in at least a part of the plugging portion,  
and a diameter of the through-hole is 0.2 mm or more, but not  
more than a value which is smaller between 1 mm and 75% of a  
20 diameter of an inscribed circle of the through channel; said  
method comprising the steps of:

injecting a ceramic paste forming a plugging portion  
into predetermined through channels from one of their end  
faces; and

25 subsequently subjecting either the ceramic paste  
thus injected or a plugging portion formed from the ceramic  
paste thus injected to a processing to form a through-hole in

the plugging portion.

11. The method according to claim 10, wherein the processing to form a through-hole in the plugging portion is  
5 to spray a fluid onto the ceramic paste injected.

12. The method according to claim 11, wherein the fluid to be sprayed to the ceramic paste is any of compressed air, steam, and water.

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13. The method according to claim 10, wherein the processing to form a through-hole in the plugging portion is to insert a rod-shaped thermoplastic organic material or a rod-shaped combustible material in ceramic paste, when or  
15 after injecting the ceramic paste forming the plugging portion in the end of the through channel; and subsequently heat a resultant honeycomb structure to allow the rod-shaped thermoplastic organic material to melt to flow out therefrom, or to allow the rod-shaped combustible material to burn to  
20 remove therefrom, so that a through-hole is formed in the plugging portion.

14. The method according to claim 13, wherein the rod-shaped thermoplastic organic material is a wax material  
25 selected from the group consisting of paraffins, or a plastic resin.

15. The method according to claim 13, wherein the rod-shaped combustible material is a wax material selected from the group consisting of paraffins, a plastic resin, or wood.

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16. The method according to claim 10, wherein the processing to form a through-hole in the plugging portion is to press a drill jig including a plurality of protrusions attached to a plate-like base onto the ceramic paste injected to form a through-hole in the plugging portion.

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17. The method according to claim 10, wherein the processing to form a through-hole in the plugging portion is to irradiate a part of the ceramic paste injected with laser to form a through-hole in the plugging portion.

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18. The method for according to claim 17, wherein the through-hole is formed after having formed the plugging portion from a ceramic paste injected.

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19. The method according to claim 10, further comprising the steps of:

mixing a melting point lowering component for lowering a melting point of cordierite into solvent to prepare a mixed solution;

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attaching the mixed solution to the end of the honeycomb structure of cordierite; and

subsequently calcining the honeycomb structure to increase a thickness of a portion to which the mixed solution has been attached, so that the plugging portion including a through-hole is formed.

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20. The method according to claim 19, further comprising:

forming the plugging portion including the through-hole; and

10 disposing a reinforced portion densified as compared with a portion other than the end in the end.

21. The method according to claim 19, wherein the honeycomb structure to which the mixed solution is to be  
15 attached is an unfired dry material, and the solvent of the mixed solution is a water-insoluble or water-soluble organic solvent.

22. The method according to claim 19, wherein the  
20 honeycomb structure to which the mixed solution is to be attached is a pre-calcined calcined material, and the solvent of the mixed solution is water.

23. An exhaust gas purification system for  
25 trapping/collecting/removing particulate materials containing carbon as a major component included in dust-containing fluids such as an exhaust gas of an internal combustion

engine, the system comprising:

a honeycomb structure comprising a plurality of through channels extending to an axial direction of a honeycomb structure, porous partition walls separating through channels one another, and plugging portions; said plugging portion plugging predetermined through channels at one end and the rest of through channels at other end opposite to the plugged end of the predetermined through channels, wherein a through-hole is formed in at least a part of the plugging portion, and a diameter of the through-hole is 0.2 mm or more, but not more than a value which is smaller between 1 mm and 75% of a diameter of an inscribed circle of the through channel, which is used as a filter for trapping/collecting the particulate materials; and

heating means for burning the particulate materials trapped/collected by the honeycomb structure to regenerate a filtering capacity,

wherein a through-hole in a plugging portion of the honeycomb structure is such a structure that the honeycomb structure is closed by the trapping/collecting and depositing of the particulate materials, that the closed through-hole opens by the burning of the particulate materials by heating at the time of the regeneration, and that at least some of unburnt materials such as ashes deposited in the honeycomb structure are discharged from the honeycomb structure with flow of the dust-containing fluids, when the through-hole opens.

24. The exhaust gas purification system according to claim 23, wherein the heating means is any one of an electric heater, a burner using a gas or liquid fuel, a microwave generation apparatus, and heating means for  
5 discharging unburnt fuel components in the exhaust gas of the internal combustion engine and for burning the unburnt fuel components by a catalytic reaction to raise an exhaust gas temperature.